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BEFORE THE

COMMITTEE ON HOMELAND SECURITY

SUBCOMMITTEE ON PREVENTION OF NUCLEAR AND BIOLOGICAL ATTACK

UNITED STATES HOUSE OF REPRESENTATIVES

HEARING ON

“BIOSCIENCE AND THE INTELLIGENCE COMMUNITY”

PRESENTED ON

NOVEMBER 3, 2005

November 3, 2005

Good morning Chairman Linder, Ranking Member Langevin, and Members of the Committee. It is an honor to have this opportunity to present my thoughts to you on a topic of substantial importance to the security of the United States. To begin, let me provide you with a few brief comments on my background and the expertise that I bring to the issues at hand today.

I am trained both as a physician and practitioner of infectious diseases, as well as a research microbiologist, and currently run a laboratory of basic investigation into the mechanisms of microbial disease and the discovery of novel microbial agents of disease. I have served as a professor of medicine and of microbiology at Stanford University since 1994. Through relationships forged in the mid-1990's as a research funding recipient and reviewer for the Defense Advance Research Projects Agency, I was asked in 1997 to join a newly-formed advisory group at the Defense Intelligence Agency, known as Biochem 20/20. This group of academic, industry, and government experts (which also includes Dr. Franz) identifies and assesses current and future threats related to the potential misuse of the life sciences and associated technologies, and advises the intelligence community. I have participated in a variety of studies at the National Academies of Science on future biological threats, served on biodefense advisory groups for the Departments of Defense and Energy, and am currently a member of the National Science Advisory Board for Biosecurity.

Challenges

Today, we are blessed with a set of unprecedented opportunities in the life sciences and with them, a set of serious and formidable challenges. The pace of advance in the life sciences and related technologies continues to accelerate at a dizzying rate. New insights and discoveries are arising in unpredictable fashion from the convergence of previously unrelated scientific disciplines. These advances in the life sciences have become globally disseminated, and made widely accessible due to the inherent openness of the life sciences enterprise. For example, biological engineering of microbes can now be executed in the home. While these advances enable broad and powerful new tools for improving health and treating disease, they also carry with them unavoidable, inherent risks of misuse and possible harm.

One of the most important approaches for addressing these potential threats is to anticipate and interdict them before they cause harm. (This concept is relevant to biological threats of both natural and man-made origin.) Prevention is far more cost-effective than response and recovery. To be able to anticipate future biological threats one needs a robust, experienced, agile and creative intelligence collection and analysis capability. How does this need stack up against current capabilities?

Reality Check

Unfortunately, current intelligence community capabilities and expertise in the life sciences and related technologies are not sufficient to meet these challenges. Historically, most investments in expertise within the intelligence community in the realm of science and technology have emphasized the physical sciences. (When referring to the "intelligence community", I mean to include the national security communities at large.) Relatively few biologists have been recruited to work within this community. Those that have been recruited are thinly and unevenly distributed across vast agencies, assigned huge portfolios, and quickly become sequestered and cut off from the daily buzz of communication, sharing and discussion that is the essential fuel of the life sciences. Separation from today's workplace in the life sciences inevitably leads to ineffectiveness and an inability to appreciate the cutting edge or to predict future trends. This problem is compounded when analysts and collectors are re-assigned to entirely new areas of work or moved to new administrative positions on a frequent basis. In short, at the present time, bioscience expertise within the intelligence community is too patchy and thin, inadequately coordinated, unsustained, and becomes rapidly outdated.

In theory, an inadequate set of resources within the intelligence community might be partially offset by efforts to borrow or share resources (e.g., expertise) from outside the community. For example, groups of outside experts might provide a continuing, direct link to some of the most relevant, advancing frontiers in the life sciences, as well as assessments of future threats and current intelligence. Although efforts of this type have taken place, and are worth discussing in some detail as part of this hearing, the net result has failed so far to meet the community's needs. However, I believe that more can be done with this approach, as well as with complementary approaches to build the internal expertise of the intelligence community. In particular, I am relatively optimistic that the traditional cultural barriers between this community and today's life sciences communities can be overcome.

Possible solutions

Let me offer some thoughts about two basic solutions: an internal approach and an external approach.

First, in building a more robust, sustained and effective internal capability in the life sciences within the intelligence community, it is critical that state-of-the-art scientific expertise guide both, intelligence collection and intelligence analysis.

--Researchers with doctoral degrees in the life sciences and working experience at the cutting edge in their respective fields need to be recruited in substantial numbers to the intelligence community.

--Significant efforts will also be needed to retain these individuals and maintain their intimate familiarity and connectedness with the cutting edge in their respective disciplines. Regular assignments to the scientific workplace may be necessary. Continuing advanced scientific education is essential. The intelligence community should avoid assigning these scientists to unrelated jobs and responsibilities.

Second, efforts to create an external advisory entity to the intelligence community on matters related to threats from the life sciences and related technologies should be expanded, strengthened, and given high priority. On this point, I support Recommendation 13.1 of The Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction (Report, March 31, 2005; Silberman and Robb, Co-Chairmen) which suggests the creation of an advisory group, that they have named the "Biological Sciences Advisory Group". DIA's Biochem 20/20 provides some examples of features that would be desirable.

--This advisory group should provide guidance on anticipating future technological and conceptual developments in the life sciences, provide guidance on intelligence targeting and collection requirements, provide expert analysis of relevant intelligence, and provide an independent "reality-check" on technical assessments in the life sciences.

--The group should operate under the auspices of the national security and intelligence community leadership, and provide input at the highest levels of these communities. The WMD Commission suggestion that such a group report to the Director of National Intelligence should be strongly considered.

--The group should operate independently and initiate its own analyses, as well as respond to requests from the intelligence, national security, and policy-making communities. It should have access to any and all intelligence that is relevant to its work. The group should generate analysis products that are available to the broad outside scientific community, as well as products at the classified level.

--The group should be composed of leading experts from academia, industry, and government, from a wide range of disciplines. A core set of dedicated members should meet frequently enough to establish close working relationships between the outside experts and the intelligence community representatives. This has been a particularly important and successful feature of DIA's Biochem 20/20.

--Given that both, potential threats and solutions are globally dispersed, every effort should be made to share the output of this advisory group with its international counterparts.

It is my sense that many leading figures in the life sciences and technology communities would be more than willing to participate in a serious effort to establish a productive and effective working relationship with members of the intelligence community.

Conclusions

In conclusion, we face daunting challenges from rapidly accelerating advances in the life sciences and related technologies, and the inherent dual use risks that they pose with respect to potential future biological threats. Anticipating, recognizing and interdicting these threats will not be easy. But we cannot afford not to try. The critical

elements of a meaningful effort in this regard will include 1) building a more robust and sustained expertise in the life sciences within the intelligence community, and 2) creating an external expert advisory group with a close working relationship to this and related communities. Given the similarity of my recommendations with those from other policy and review groups, and what I perceive to be receptive, relevant parties, the time is now opportune for action.

I am happy to answer any questions.